ASRTU SPECIFICATION FOR POLYURETHANE PAINT 2K (TWO PACK) FOR USE ON MOTOR VEHICLES

0.0 SPECIFICATION NO. : AS:375:87:OCT:2021

1.0 SCOPE :

1.1 This standard prescribes requirements and methods of test for Polyurethane Paint 2K (Two Pack), Full gloss, Metallic and Matt finish (shade) for use on motor vehicles.

1.2 This is a purchase specification and does not include manufacturing details. The material supplied against this specification shall be compatible with the original equipment.

1.3 The supplier shall provide detail specifications to the purchasing/ inspecting authority whenever such information is specifically called for.

1.4 The material offered against this specification shall conform to this specification in full. The tests shall be carried out on the material or on the test specimen prepared from the material. If any of the samples fail in any one or more tests specified, the sample shall be considered as not having met the requirements of this specification.

1.5 It is the manufacturer's prime responsibility to satisfy the inspection authority that the commodity conforms to this standard. This may be accomplished by performing the tests specified in this standard.

1.6 Sample selection shall be the responsibility of the Quality Assurance Officer. Required quantity for complete testing as per this specification shall be supplied.

1.7 This specification supersedes earlier specifications including AS:375:83:SEP:2016.

2.0 APPLICATION:

2.1 This material is used for painting of systems for protection against corrosion and decoration of bus bodies.

3.0 REFERENCE STANDARDS:

i)	IS:13213:2018	Polyurethane Full gloss Enamel (Two pack) specification
ii)	IS :101 Part 1 to 9	Methods of test for Paints.
iii)	RAL Shade Card	Colour shade card
iv)	IS : 8662:2004 (Reaff. 2019)	Enamel, Synthetic Exterior Specification
v)	IS:5:2007 (Reaff. 2017)	Colours for ready mixed paints and enamels.

vi)	SAE J 2527: 2004-02	Performance based standard for Accelerated exposure of Automotive Exterior Material using A Controlled Irradiance Xenon Arc apparatus.
vii)	IS:2074:92 (Reaff. 2014)	Ready mixed paint, air drying, Red oxide Zinc- chrome priming.

4.0 TEST QUANTITY:

The complete PU Paint 2K system shall be supplied for testing as under -

a) Minimum 2 litres of Top Coat with its Hardener – ½ litre and its Thinner – ½ litre shall be supplied with mixing ratio.

b) Epoxy/ Etch Primer – ½ litre with its Hardener – ½ litre and its Thinner – ½ litre shall be supplied with mixing ratio.

c) PU Surfacer – ½ litre with its Hardener – ½ litre and its Thinner – ½ litre shall be supplied with mixing ratio.

In case Base Coat & Clear Coat System, Minimum 2 litres of Base/Top Coat with its Hardener – ½ litre & its Thinner – ½ litre shall be supplied with mixing ratio along with Clear Coat – ½ litre and its ancillaries, if any. Other ancillaries like Epoxy/ Etch Primer – ½ litre with its Hardener – ½ litre and its Thinner – ½ litre and PU Surfacer – ½ litre with its Hardener – ½ litre and its Thinner – ½ litre shall be supplied with mixing ratio.

All materials shall be supplied from the same manufacturer and from the same source.

5.0 GENERAL REQUIREMENTS:

5.1 The material shall be supplied as Epoxy/ Etch Primer, PU Surfacer & top coat with ancillaries as a whole system and mixing ratio to be declared by the manufacturer. The material will be applied by spraying. Solvent to be used for spraying consistency shall be supplied by the manufacturer.

5.2 The smell of the material shall not be objectionable during application.

5.3 **Composition** :
The paint shall consists of two components, base (top coat) & hardener to be mixed in proportion by volume, declared by manufacturer.

6.0 TEST METHOD & REQUIREMENTS:

6.1 Tests shall be conducted according to the test methods prescribed in specification. References to the various clauses of these standards are given in Column 4 of Table- 1.

6.2 **Accelerated Weathering Test:**

6.2.1 The characteristics of a film of the material from the sample under test as prescribed in Appendix `A' when tested in the accelerated weathering apparatus for period of 800 hours shall not deviate more than the limits specified in Table-2.

6.3 The material shall also comply with the requirements given in Table- 1.

7.0 PACKING & MARKING:

7.1 **Packing**:`

Shall be packed as per the ratio declared by the manufacturer in tin containers.

7.2 **Marking**:

Each container shall be marked with the following:

a) Name of the material with Specification No. according to which supplies are made and ISC Colour Code as per IS:5:2007 and paint spot on the top and bottom of the container.
b) Trade mark, if any;
c) Volume of the material;
d) Month and year of manufacture.

7.3 Marking and Packing being non-critical informative parameter to be recorded

Table – 1

Sr. No	Characteristic	Requirement	Method of Test
1 i)	Drying Time (a) Surface dry (b) Hard dry (c) Hard dry, 70°C	 20 minutes, (Max.) 24 hrs, (Max.) 30 minutes with 15 minutes flash off time, (Max.)	IS:101(Part 3 / Sec.1)
ii)	Consistency	Smooth and uniform and suitable for spray application.	IS:101(Part 1/ Sec 5)
iii)	Finish	Smooth and glossy / matt / metallic	IS:101(Part 3/Sec 4)
v)	Colour	Close match to be specified IS colour or to an agreed colour	IS:101(Part 4/Sec 2)
v)	Volume solids, min	40 percent	IS:101(Part 8/Sec 6)
vi)	Scratch hardness after 48 hrs. air drying	No such scratch as to show bare metal at a load of 2000 gms.	IS: 101 (Part 5 /Sec 2)
vii)	Flexibility and adhesion 96 hrs. air drying	No visible damage or detachment of film after 96 hrs. air drying followed by cooling for 5 hrs at 0°C & subsequently bending on 6 mm dia rod.	IS: 101 (Part 5/ Sec.2)
viii)	Flash Point	Not below 20°C	IS: 101 (Part 1/Sec 6)
ix)	Fineness of grind	20 microns, max	IS: 101 (Part 3/Sec 5)
x)	Pot Life, 27 ± 2°C	6 hours, min	IS:13213 Appendix E

Sr. No	Characteristic	Requirement	Method of Test
xi)	Gloss at 60° angle of incidence, a) Full gloss b)Metallic finish (shade) with clear coat c)Metallic finish (shade) without clear coat d) Matt finish (shade)	 90, (Minimum) 80, (Minimum) 30, (Maximum) 30, (Maximum)	IS: 101 (Part 4/Sec.4)
xii)	Weight in kg/10Ltre, min	9	IS: 101 (Part 1/Sec.7)
xiii	Accelerated Tests: a) Resistance to 30% sulphuric Acid for 24 hours b) Resistance to 20% caustic potash for 24 hrs c) Resistance to Lub oil for 24 hrs. d) Resistance to Diesel for 24 hrs	Shall not show any signs of blistering, wrinkling and lifting. Gloss retention shall be minimum 50% of the original gloss value. There will no applicable change in colour.	IS:13213 IS:101(Part 7 / Sec 2)
xiv)	Salt spray test for 240 hrs, Solution of 5% NaCl concentration	There shall be no signs of breakdown and the underlying metal shall be free from corrosion**.**	IS:101(Part 6 / Sec 1)
xv)	Impact Test (Direct) 1 kg Indenter at 1 Metre height on 145 mm x 65 mm panel.	There shall be no signs of deteriation of the film	IS:101(Part 5 / Sec 3)
xvi)	Durability Test Accelerated Weathering test As per SAE J 2527:2004 - 02	Shall pass the test	Appendix A
xvii)	Packing & Marking	Shall be marked	-

Appendix `A'

Accelerated Weathering Test

A-1 **Outline of the Method**

The durability of the material is determined by ascertaining actual behaviour of suitably prepared test panels in an accelerated weathering test for a specified period and evaluating the results of the exposure by a suitable method of rating for various characteristics of the film of the material. The prepared test panels are subjected to controlled exposure of heat, light and water in the artificial weathering apparatus. (Xenon Arc Weatherometer).

A-2 **Test Panels**

The panel shall be mild steel plate, 1.25mm thick and free from surface defects, conforming to IS:513. Test panels shall be 145mm x 65mm in size. The panels shall be cleaned as prescribed in IS:101(Part 1/ Sec.3). The edges of the panels shall be protected with two coats of primer / gelling.

A-3 Preparation of Test Panels

3.1 The test panels at every stage of preparation shall be air dried at 25 to 30°C and relative humidity of 60 to 70 percent.

3.2 The surface of the test panels to be exposed shall be prepared as follows, taking care that total dry film thickness of the complete system shall be between 75 and 100 microns.

a) Apply one coat of ready mixed paint Red Oxide-zinc chrome primer (IS:2074) by spraying/brushing/dipping and allow to air dry for 24 Hrs.

b) Rub down lightly with water-proof emery paper No. 280/320, wipe off the surface using a piece of clean and dry soft cloth and then apply by spraying/brushing/dipping one coat of the undercoating enamel and allow to air dry for 24 Hrs.

c) Rub down, wet, with waterproof emery paper No. 320, wipe off the surface using a piece of clean and dry soft cloth and then apply by spraying/brushing/dipping one coat of the top coat and allow to air-dry for 48 Hrs.

d) Rub down, wet, with waterproof emery paper No. 320, wash and wipe off water and when the surface is dry, apply by spraying/brushing/dipping a second coat of the top coat and allow to air-dry for 7 days before subjecting to exposure test.

e) For Base Coat clear coat systems – Apply Epoxy / Etch primer allow 24 hrs air drying, apply primer grey allow 24 hrs air drying, apply base coat allow 30 to 45 minutes air drying, apply clear coat and allow to air-dry for 7 days before subjecting to exposure test. To follow manufacturer's instruction for preparation of panels if provided.

A-4 **Accelerated Weathering Apparatus**

An artificial weathering apparatus of Xenon Arc type for uniform and controlled exposure, to effect of heat, lights and water.

A-5 **Procedure**

The panels for this test prepared as described above, shall be tested for 800 hrs and examined at the end of the period for various characteristics described in Table 2.

A-6 Test Conditions

Operate the Xenon Arc Weather-O-Meter with automatic control for maintaining following test conditions as per SAE J 2527:2004 – 02.

Filter combination: Inner: Type S Boro Silicate
Outer: Type S Boro Silicate

Irradiance : 0.55 W/m2 at 340 nm during light hours

Operate the apparatus with automatic control of light & dark cycle as mentioned below segments:

Light Cycle Setting	
Irradiance	0.55 W/m2
Black Panel Testing	70°C
Chamber Temperature	47°C
Relative Humidity	50%

Dark Cycle Setting	
Chamber Temperature	38°C
Relative Humidity	95%

	Segment 1	Segment 2	Segment 3	Segment 4
Cycle	Dark	Light	Light	Light
Duration	60 min.	40 min.	20 min.	60 min.
Specimen Spray	On	Off	On	Off
Rack Spray	On	Off	Off	Off

A-7 Evaluation and Rating of film characteristics of Test Panel.

The test panels before and after the specified period of exposure tests shall be assessed for the various film characteristics as detailed in Table- 2. The test panel shall be compared against intact (initial) panel considering initial rating 10.

TABLE – 2

Sr. No.	Characteristics	Requirements
1	Loss in initial Gloss, Specular at 60° a) Full gloss b)Metallic finish (shade) with clear coat c)Metallic finish (shade) without clear coat d) Matt finish (shade)	 10% Max. 10% Max. 20% Max. 20% Max.
2	Colour change, Minimum	7- 8
3	Freedom from Checking, Minimum Rating	10
4	Freedom from Cracking, Minimum Rating	10
5	Freedom from Flaking, Minimum Rating	10
6	Freedom from Chalking, Minimum Rating	10
7	Freedom from Spotting, Minimum Rating	10
8	Freedom from Blistering and Corrosion	10

WEIGHTAGE MARKS FOR POLYURETHANE PAINT 2K (TWO PACK) FOR USE ON MOTOR VEHICLES

(AS:375:87:OCT:2021)

Sr. No.	Test Parameter	Clause No.	Marks Allotted	P/T
1.	Drying Time : a) Surface Dry b) Hard Dry c) Hard Dry 70°C	6.1,Table-1(i)	6	P
2.	Consistency	6.1,Table-1(ii)	4	P
3.	Finish	6.1,Table-1(iii)	4	T
4.	Colour	6.1,Table-1(iv)	3	T
5.	Volume Solids	6.1,Table-1(v)	5	P
6.	Scratch Hardness	6.1,Table-1(vi)	4	T
7.	Flexibility & Adhesion	6.1,Table-1(vii)	4	T
8.	Flash Point	6.1,Table-1(viii)	6	P
9.	Fineness of Grind	6.1,Table-1(ix)	3	P
10	Pot Life	6.1,Table-1(x)	3	P
11.	Gloss at 60°	6.1,Table-1(xi)	5	P
12.	Weight in Kg/10lit	6.1,Table-1(xii)	5	P
13.	Accelerated Test a) Resistance to 30% H2So4 b) Resistance to KOH 20% c) Resistance to Lub. Oil d) Resistance to Diesel	6.1,Table-1(xiii)	 2 2 2 2	 P P P P
14.	Salt Spray Test	6.1,Table-1(xiv)	5	T
15.	Impact Test	6.1,Table-1(xv)	5	T
16.	Durability Test: Accelerated Weathering Test	6.1,Table-1(xvi) & Appendix 'A'		
I	Loss in initial Gloss, Specular at 60°	Table-2(1)	10	P
Ii	Colour Change, Min.	Table-2(2)	5	P
Iii	Freedom from Checking, Min. Rating	Table-2(3)	3	P
Iv	Freedom from Cracking, Min. Rating	Table-2(4)	3	P
V	Freedom from Flaking, Min. Rating	Table-2(5)	3	P
vi	Freedom from Chalking, Min. Rating	Table-2(6)	2	P
vii	Freedom from Spotting, Min. Rating	Table-2(7)	2	P
viii	Freedom from Blistering & Corrosion	Table-2(8)	2	P
		TOTAL	**100**	

P = Proportionate marks shall be considered.
T = Total marks shall be considered